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Eric W. Olson
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RBG-47598

July 29, 2015

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Subject: Licensee Event Report 50-458 / 2015-005-00
River Bend Station – Unit 1
Docket No. 50-458
License No. NPF-47

RBF1-15-0121

Dear Sir or Madam:

In accordance with 10 CFR 50.73, enclosed is the subject Licensee Event Report. This document contains no commitments. If you have any questions, please contact Mr. Joseph Clark at 225-381-4177.

Sincerely,

Eric W. Olson

EWO/dhw

Enclosure

cc: U. S. Nuclear Regulatory Commission
Region IV
1600 East Lamar Blvd.
Arlington, TX 76011-4511

NRC Sr. Resident Inspector
P. O. Box 1050
St. Francisville, LA 70775

IE22
NRR

INPO
(via ICES reporting)

Central Records Clerk
Public Utility Commission of Texas
1701 N. Congress Ave.
Austin, TX 78711-3326

Department of Environmental Quality
Office of Environmental Compliance
Radiological Emergency Planning and Response Section
Ji Young Wiley
P.O. Box 4312
Baton Rouge, LA 70821-4312

NRC FORM 366 (02-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

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4. TITLE

Automatic Reactor Scram Due to Low Reactor Water Level Following a Loss of Instrument Power

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
6	1	2015	2015	- 005	- 00	07	29	2015		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☑ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
90	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Joseph A. Clark, Manager - Regulatory Assurance	(225) 381-4177

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
n/a									

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☑ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On June 1, 2015, at 9:09 p.m. CDT, with the plant operating at 90 percent power, an unplanned automatic reactor scram occurred due to low reactor water level. This event resulted from the loss of a non-safety related instrument power panel, apparently caused by an internal electrical transient in a 125-volt AC / DC inverter. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) as the automatic actuation of the reactor protection system. All reactor control rods inserted normally, and control of reactor parameters was promptly established using the main turbine bypass valves and the main feedwater system. An expected general containment isolation signal occurred when reactor water level decreased to Level 3. The "A" reactor recirculation pump shifted to slow speed as designed, while the "B" pump tripped off. The runback feature of the reactor recirculation flow control valves failed to operate due the loss of instrument power. No plant parameters requiring the actuation of the emergency diesel generators, the main steam safety-relief valves, or the emergency core cooling systems were exceeded. This event was, thus, of minimal safety significance to the health and safety of the public.

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NARRATIVE

REPORTED CONDITION

On June 1, 2015, at 9:09 p.m. CDT, with the plant operating at 90 percent power, an unplanned automatic reactor scram occurred due to low reactor water level. All reactor control rods inserted normally, and control of reactor parameters was promptly established using the main turbine bypass valves and the main feedwater system. No reactor main steam relief valves actuated, and no emergency core cooling systems were required to initiate. Operators entered the emergency operating procedures for reactor pressure vessel control (for the low water level condition), primary containment control (for high containment atmospheric pressure), and secondary containment control (due to abnormally high drain sump water levels). An expected general containment isolation signal occurred when reactor water level decreased to Level 3. The "A" reactor recirculation pump shifted to slow speed as designed, while the "B" pump tripped off. The runback feature of the reactor recirculation flow control valves failed to operate.

Troubleshooting by the operators determined that this event was initiated by the loss of 24-volt DC instrumentation power (EE). This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) as the automatic actuation of the reactor protection system.

INVESTIGATION AND IMMEDIATE CORRECTIVE ACTIONS

The initial troubleshooting during the scram recovery determined that a power failure had occurred on a balance-of-plant (non-safety related) instrumentation panel. The panel is supplied with 120-volt AC through a disconnect switch with a 30-amp fuse. The 120-volt power feeds four parallel 24-volt DC power supplies. On the output of each power supply is a power indication status light and a power supply failure alarm relay. The loss of power caused the following malfunctions in plant systems:

1. The main reactor feedwater pump minimum flow valves and the heater drain pump recirculation valves all failed open. This had the effect of diverting a significant portion of feedwater system flow directly back to the main condenser, causing reactor water level to decrease. As the feedwater flow control valves opened in response to the low reactor water level, feedwater system pressure decreased to the point where the low suction pressure switches for the feedwater pumps tripped. The trip of the "A" and "C" feedwater pumps was a normal response to this condition. The "B" pump should have tripped, but a relay failure in the circuitry caused it to continue to operate.

2. The turbine building chillers, the normal source of cooling for the primary containment, shut down due to the loss of instrumentation power.

3. The reactor water cleanup system shutdown due to the high area temperatures following the loss of cooling from the turbine building chillers.

4. The runback feature of the reactor recirculation flow control valves failed to function due to the loss of power to main feedwater flow instruments.

Electricians performed detailed troubleshooting, and it was found that the 120-volt disconnect switch was closed and that power was available downstream of the 30-amp fuse. The four input fuses to the 24-volt power supplies were all found to be blown, while no other fuses in the panel were affected. Prior to the event, the 120-volt panel had been aligned to the normal uninterruptible power supply (UPS). No work activities were being performed in or on the affected control room panel, the UPS, or the 120-volt panel prior to the event. No abnormal indications were present on the UPS panel prior to or following the event.

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NARRATIVE

The investigation team concluded that the most probable cause of this event was a power transient created by the failure of a capacitor in the output circuitry of the UPS. The loss of instrument power resulted from the failure of the input fuses on all four 24-volt power supplies. The cause of the power supply input fuse failures was not conclusively identified. However, failure analysis determined the fuses failed due to one or a combination of the following conditions:

• A failed capacitor in the output of the UPS caused a transient that exposed the power supply to a large inrush current, which exceeded the rating of the fuses.

• One or more blown input fuses on the power supplies, coupled with low margin in the power supply fuse design and load imbalance. Testing was not able to create a cascading failure by removing individual power supplies from service at normal loading conditions. This is a probable cause but could not be proven or disproven.

CORRECTIVE ACTIONS to PREVENT RECURRENCE

Based on the UPS vendor recommendation, the 6-amp fast-blow fuses on the input side of the 24-volt power supplies were replaced with 10-amp slow-blow fuses. Following an upcoming UPS maintenance outage in September, all the replaced capacitors will be tested for obvious signs of failure or degradation. Any suspect capacitors will be sent offsite for failure analysis.

PRIOR OCCURRENCE EVALUATION

No similar events have been reported by River Bend Station in the previous three years.

SAFETY SIGNIFICANCE

Aside from the specific abnormalities described above, the overall response of the plant to this actuation of the reactor protection system was as expected. No plant parameters requiring the actuation of the emergency diesel generators or the emergency core cooling systems were exceeded. This event was, thus, of minimal safety significance to the health and safety of the public.